REMARKS

Prior to the present response, claims 18-25 and 27-37 were pending in the present application. By the present amendment and response, independent claims 18, 25, and 33 have been amended to overcome the Examiner's objections and claims 23 and 31 have been canceled. Thus, claims 18-22, 24-25, 27-30, 32-37 remain in the present application. Reconsideration and allowance of pending claims 18-22, 24-25, 27-30, 32-37 in view of the above amendments and the following remarks are requested.

A. Rejection of Claims 18-22, 24, 25, 27-30, and 32-37 under 35 USC §102(b)

The Examiner has rejected claims 18-22, 24, 25, 27-30, and 32-37 under 35 USC §102(b) as being anticipated by U.S. patent number 5,734,703 to Yuichiro Hiyoshi ("Hiyoshi"). For the reasons discussed below, Applicants respectfully submit that the present invention, as defined by amended independent claims 18, 25, and 33, is patentably distinguishable over Hiyoshi.

The present invention, as defined by amended independent claims 18 and 25, includes, among other things, an interface circuit including a voltage-controlled current source including an electronic inductor transistor and a second transistor, where the second transistor has a base connected to a collector of the electronic inductor transistor, and where the second transistor provides increased isolation for a modem when the modem is on-hook. As disclosed in the present application, according to various embodiments of the invention, an operational amplifier is utilized to drive the base of an

electronic inductor transistor and receives negative feedback from the emitter of the electronic inductor transistor.

As disclosed in the present application, the combination of the electronic inductor transistor and the operational amplifier form a voltage-controlled current source (VCCS) with respect to loop current. As disclosed in the present application, according to one embodiment of the invention, a second transistor, which has a base coupled to a collector of the electronic inductor transistor, an emitter coupled to a rectified Tip and Ring voltage, and a collector coupled to an impedance matching circuit, is utilized to provide increased isolation for the modem when the modem is on-hook.

In the configuration discussed above, the operational amplifier linearizes the voltage signal at the emitter of the electronic inductor transistor (through the negative feedback input), and causes the line current to swing linearly. By appropriately setting the collector voltage, the present invention can advantageously provide a harmonic content or distortion of the transmitted signal that is at least 80 dB below the fundamental signal level. As a result, the present invention advantageously achieves an acceptable level of distortion for high-speed modem applications and advantageously provides increased modem on-hook isolation.

In contrast to the present invention as defined by amended independent claims 18 and 25, Hiyoshi does not teach, disclose, or suggest an interface circuit including a voltage-controlled current source including an electronic inductor transistor and a second transistor, where the second transistor has a base connected to a collector of the electronic

inductor transistor, and where the second transistor provides increased isolation for a modem when the modem is on-hook. Hiyoshi relates to a hybrid circuit for carrying out a four-wire to two-wire conversion of a channel, and to a data communication unit such as a MODEM for incorporating the hybrid circuit. See, for example, Hiyoshi, column 1, lines 12-15. Hiyoshi specifically discloses a circuit arrangement including circuit driver (an output driver) 520, which is connected across diode bridge 103 and coupled to transmitting terminals E and F of a four-wire circuit by photo-coupler 12, and semiconductor inductor circuit 540, which is also connected across diode bridge 103 and coupled to receiving terminals G and H of the four-wire circuit by photo-coupler 13. See, for example, column 18, lines 3-5 and Figure 9 of Hiyoshi.

However, Hiyoshi fails to teach, disclose, or remotely suggest an interface circuit including a voltage-controlled current source including an electronic inductor transistor and a second transistor, where the second transistor has a base connected to a collector of the electronic inductor transistor, and where the second transistor provides increased isolation for a modem when the modem is on-hook, as specified by amended independent claims 18 and 25. Furthermore, in Hiyoshi, photo-couplers 12 and 13 provide isolation between respective transmitting terminals E and F of a four-wire circuit and circuit driver 520 and receiving terminals G and H of the four-wire circuit and semiconductor inductor circuit 540. See, for example, Figure 9 and related text of Hiyoshi. Thus, Hiyoshi provides no reason or motivation for coupling a second transistor to an electronic inductor

transistor so as to provide increased isolation for a modem when the modem is on-hook, as specified in amended independent claims 18 and 25.

For the foregoing reasons, Applicant respectfully submits that the present invention, as defined by amended independent claims 18 and 25, is not taught, disclosed, or suggested by Hiyoshi. Thus, amended independent claims 18 and 25 are patentably distinguishable over Hiyoshi. As such, claims 19-22 and 24 depending from amended independent claim 18 and claims 27-30 and 32 are, *a fortiori*, also patentably distinguishable over Hiyoshi for at least the reasons presented above and also for additional limitations contained in each dependent claim.

The present invention, as defined by amended independent claim 33, includes, among other things, a modem interface circuit a DC loop current circuit having a first operational amplifier and an AC current circuit having a second operational amplifier, "wherein said DC loop current circuit further comprises a voltage divider connected to a positive input of said first operational amplifier, wherein said positive input of said first operational amplifier is coupled to ground by a capacitor." As disclosed in the present application, in one embodiment of the invention, a first operational amplifier/AC transistor combination is used for the AC signal and a second operational amplifier/DC transistor combination is used for the DC loop current.

As disclosed in the present application, the DC transistor can be biased in a non-linear region at any current without introducing distortion on the AC signal. As disclosed in the present application, the AC transistor can be biased with a sufficiently low current

to operate in a linear region and provide excellent linearity in the AC signal transmitted to the line. Furthermore, as disclosed in the present application, the above configuration advantageously allows the respective gains of the AC and DC transistors to be set independently for DC and AC.

In contrast to the present invention as defined by amended independent claim 33, Hiyoshi does not teach, disclose, or suggest a modem interface circuit including a DC loop current circuit having a first operational amplifier and an AC current circuit having a second operational amplifier, "wherein an emitter of said second electronic inductor transistor is coupled to ground." Hiyoshi specifically discloses semiconductor inductor circuit 540, which includes an operational amplifier coupled to the base of a transistor, where the emitter of the transistor is coupled to a positive output of bridge 103 by a resistor and a zener diode. See, for example, Figure 9 and related text of Hiyoshi. However, Hiyoshi fails to teach, disclose, or remotely suggest a modem interface circuit including a DC loop current circuit having a first operational amplifier and an AC current circuit having a second operational amplifier, where an emitter of the second electronic inductor transistor is coupled to ground, as specified in amended independent claim 33.

For the foregoing reasons, Applicant respectfully submits that the present invention, as defined by amended independent claim 33, is not taught, disclosed, or suggested by Hiyoshi. Thus, amended independent claim 33 is patentably distinguishable over Hiyoshi. As such, claims 34-37 depending from amended independent claim 33 are,

a fortiori, also patentably distinguishable over Hiyoshi for at least the reasons presented above and also for additional limitations contained in each dependent claim.

B. Rejection of Claims 23 and 31 under 35 USC §103(a)

The Examiner has rejected claims 23 and 31 under 35 USC §103(a) as being unpatentable over Hiyoshi in view of U.S. patent number 4,796,295 to Gay et al. As discussed above, amended independent claims 18 and 25 are patentably distinguishable over Hiyoshi. Thus claim 23 depending from amended independent claim 18 and claim 31 depending from amended independent claim 25 are, *a fortiori*, also patentably distinguishable over Hiyoshi for at least the reasons presented above and also for additional limitations contained in each dependent claim.

C. Conclusion

Based on the foregoing reasons, the present invention, as defined by amended independent claims 18, 25, and 33, and the claims depending therefrom, is patentably distinguishable over the art cited by the Examiner. Thus, outstanding claims 18-22, 24-25, 27-30, 32-37 are patentably distinguishable over the art cited by the Examiner. As such, and for all the foregoing reasons, an early Notice of Allowance directed to all claims 18-22, 24-25, 27-30, 32-37 remaining in the present application is respectfully requested.

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Respectfully Submitted,
FARJAMI & FARJAMI LLP

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Michael Farjami, Esq.
Reg. No. 38,135

FARJAMI & FARJAMI LLP
26522 La Alameda Ave., Suite 360
Mission Viejo, California 92691
Telephone: (949) 282-1000
Facsimile: (949) 282-1002

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